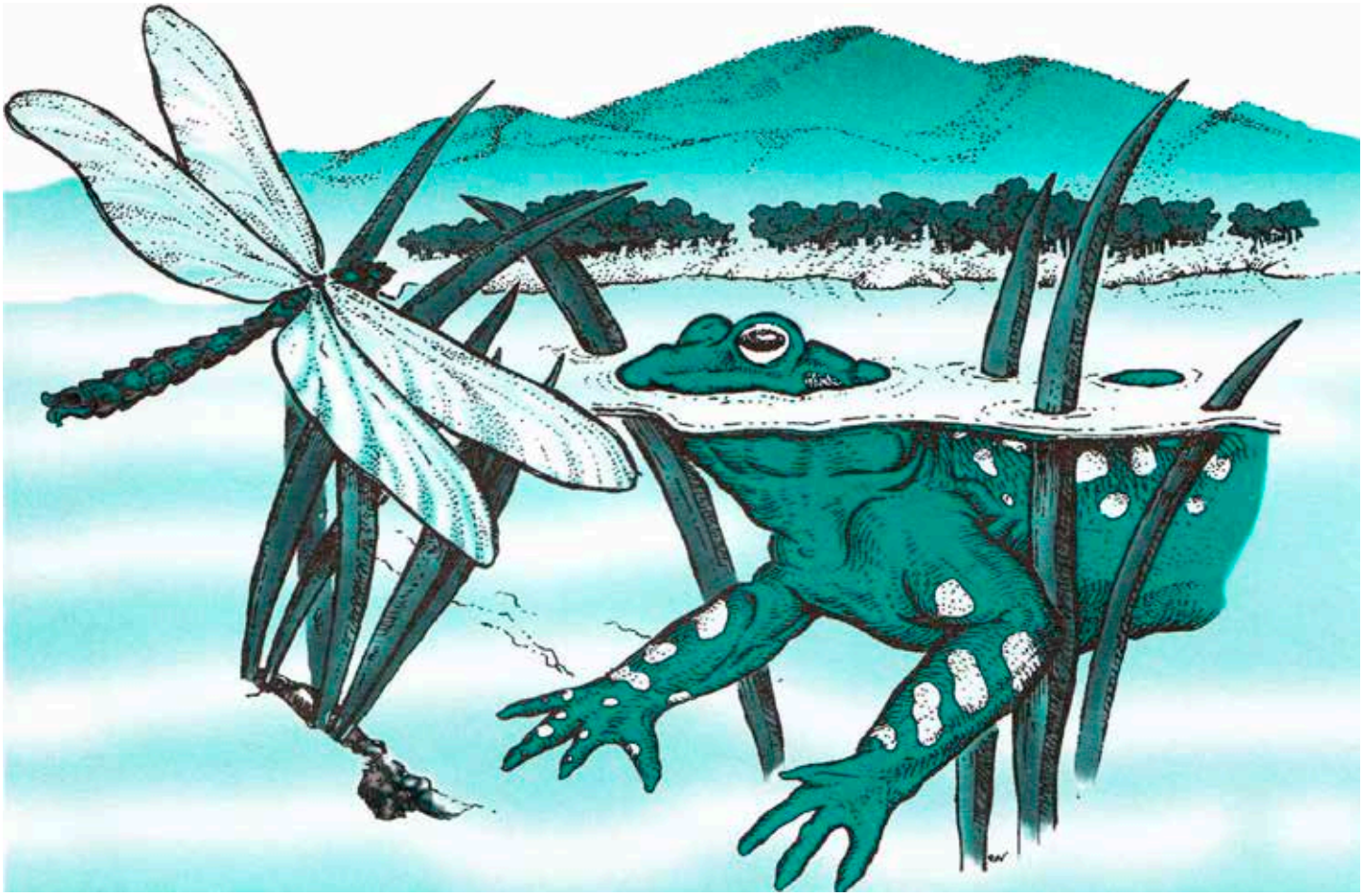
The Rio Grande and Me

El Río Grande y Yo

A Teacher's Guide
to the BioVan



Grade Level : 2-3

ABQ BioPark
903 Tenth St. SW
Albuquerque, NM 87102

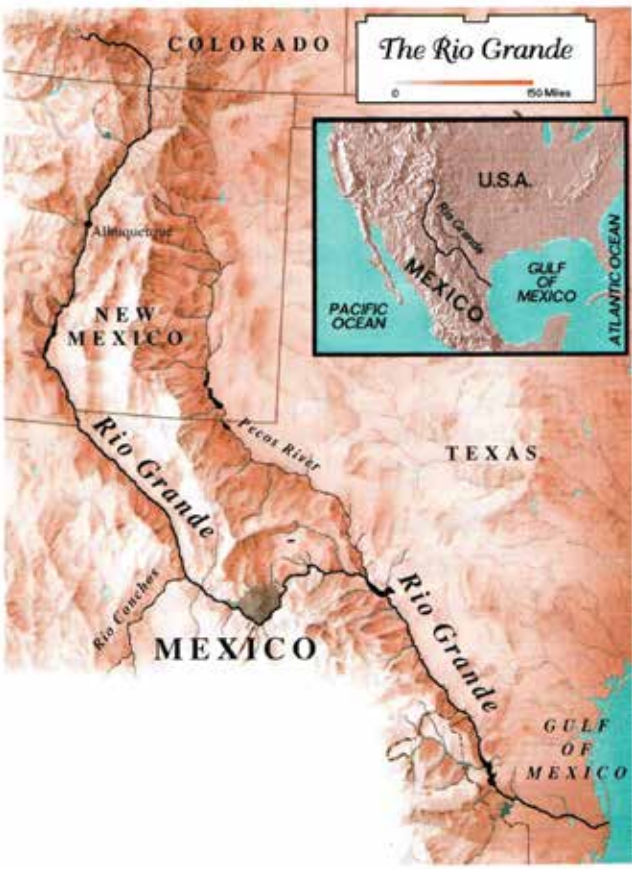
NEW MEXICO BIOPARK SOCIETY

What is the BioVan?

The BioVan is an outreach program for the Albuquerque Biological Park, which consists of the Zoo, Botanic Garden, Aquarium and Tingley Beach. The mission of the BioVan is to give students an introduction to the diversity and interdependence of life and to encourage stewardship. The BioVan theme follows the course of the Rio Grande as it starts in the San Juan Mountains of Colorado and empties into the Gulf of Mexico and open ocean of the Atlantic.

Why the BioVan?

The Rio Grande and Me. El Río Grande y Yo. It's our river and it's important to us: to the life it supports here in Albuquerque as we live alongside it, to the Gulf of Mexico nourished by its fresh water and to the oceans of the world to which it connects. Water is a critical natural resource and precious to us, especially in the Southwest Desert. The Rio Grande supports mountain, forest, river and desert ecosystems and all the plant and animal life associated with them in an interdependent web that extends further than we can imagine. In the end, what counts most is that we must be good stewards of the river, our Rio Grande. The ABQ BioPark and the BioVan help this happen.



How does the BioVan work?

The BioVan is staffed by environmental educators, a teaching artist and volunteer BioVan Rangers. It includes live animals, plants, interactive games and a performance stage. Using a variety of teaching strategies, the BioVan combines science with the arts. Other components of the program include a teacher orientation, a BioBox that contains hands-on loan materials and grade-specific Teacher's Guides.

Who supports the BioVan?

The BioVan is funded entirely through the New Mexico BioPark Society (NMBPS). Through their generous support of this program, the NMBPS demonstrates its commitment to conservation education and to the wider community. This support enables the BioVan to visit Albuquerque-area elementary schools free of charge! If you appreciate this effort, please send your comments to BioPark Education, 903 10th St. SW, Albuquerque, NM 87102, and we will pass on your gratitude to the New Mexico BioPark Society.

How to use the Teacher's Guide

BioVan Teacher's Guides are available for grades K - 1, 2 - 3 and 4 - 5. The same key concepts are noted in each Teacher's Guide. These concepts are to help guide the teacher throughout the BioVan learning experience. The grade level concepts do vary and are designed to build upon the previous grade concepts. The grade level concepts are for the students. Suggested resources are listed, including reference books for teachers, books for students use and local agencies that offer additional relevant resources.

Each Teacher's Guide has three lessons: Water as a Natural Resource, The Rio as an Ecosystem and Stewardship. Each of the lessons has two activities: one activity is hands-on and one activity is pencil-and-paper with the worksheet provided. Each lesson is designed to interrelate with the other lessons within that guide and to build upon the same lesson in the other two grade-specific guides.

Key Concepts

for teachers

Adaptation—A modification of an organism or its parts which enables it to survive and reproduce in its environment.

Aquifer—An underground layer of rock, gravel or sand that stores water.

Biodiversity—The variety of plant and animal species in an environment.

Conservation—The conscious use of natural resources in a way that assures their availability to future generations.

Ecosystem—A stable, naturally occurring system of interdependent living and non-living things.

Habitat—The dwelling place of a living thing, chosen for its availability of suitable shelter, space, food and water.

Interdependence—The relationships among living and non-living elements of the environment.

Natural Resource—A portion of the environment that can be drawn upon to care for a need

Pollution—Any substance deposited in air, water or land leading to a condition of impurity, unhealthiness or hazard.

Riparian—Relating to the bank of a waterway such as a river.

Stewardship—The wisdom and respect we demonstrate to all living organisms and the habitats entrusted to our care.

Grade Level Concepts

for students

Condensation—The process of changing a vapor into a liquid.

Evaporation—Changing a liquid into a vapor.

Living Organism—A thing that grows, reproduces, adapts and consumes or releases energy.

Precipitation—Mist, rain, snow, sleet or hail that falls from the sky.

Recycle—To make fit to be used again.

Water Cycle—The continuous process whereby water evaporates, condenses and precipitates.

Resources

BOOKS FOR STUDENTS

Cherry, Lynne. *A River Ran Wild*

Cole, Joanna. *The Magic Schoolbus on the Ocean Floor*

Jablonsky, Alice. *101 Questions About Desert Life*

Filisky, Michael. *Peterson First Guides: Fishes*

BOOKS FOR TEACHERS

Center for Marine Conservation. *The Ocean Book: Aquarium & Seaside Activities for All Ages*

Benyus, Janine M. *The Field Guide to Wildlife Habitats for the Western United States*

Hillerman, Tony. *New Mexico, Rio Grande and other Essays*

AGENCIES

City of Albuquerque, Solid Waste
www.cabq.gov/solidwaste

New Mexico Department of Game and Fish
www.wildlife.state.nm.us

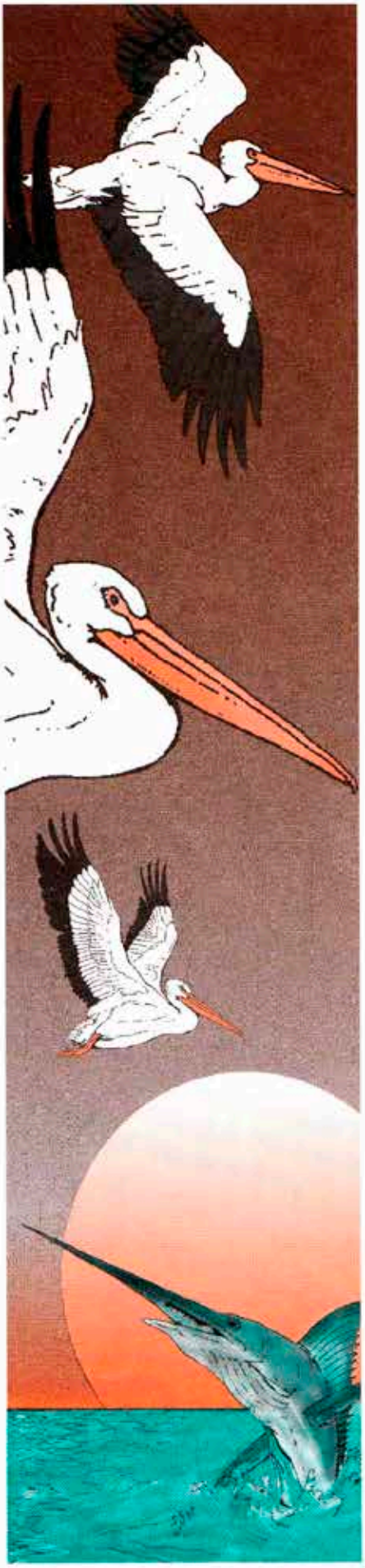
Rio Grande Nature Center State Park
2901 Candelaria NW, Albuquerque, NM 87107
www.rgnc.org
www.emnrd.state.nm.us/SPD/riograndenaturecenterstatepark.html

U.S. Geological Survey
www.usgs.gov

ADDITIONAL RESOURCES

Project WET
projectwet.org

Environmental Education Association of NM
www.eeanm.org



Water as a Natural Resource

Living creatures need substances such as oxygen, minerals and clean water from their environment in order to survive. Such substances are returned to the soil and atmosphere through natural cycles like the water cycle. It takes 4,000 years for all the water on Earth to be recycled. That is one reason it is important to keep our water free from pollution. People must take great care in introducing manufactured substances such as pesticides, petroleum products and automobile emissions into the atmosphere, water or soil because they may harm ecosystems. Water ecosystems like the Rio Grande are especially vulnerable to pollution because anything that falls on the land may eventually make its way into aquifers, rivers, lakes and oceans, affecting the living organisms that depend on the water for survival.

Water, Water, Everywhere

Explain the water cycle.

Science: Describe the water cycle.
Social Studies: Explore reasons to care for natural resources and the environment.
Language Arts: Write related complete thoughts to describe something.

Introduction: During the water cycle, the sun causes water to evaporate, changing from a liquid (fresh or salt water) to an invisible vapor in the atmosphere. The vapor may condense to form clouds and eventually change back to a liquid or solid state as precipitation (rain, snow, sleet, hail, mist). During the water cycle the same water is continuously recycled. Plants and animals also contain water which is recycled. Water returns to the ocean in streams and rivers or ends up in lakes or underground. Ask the students to think about rain and the water cycle in our region.

- How often does it rain in Albuquerque?
- Where does the rain water go?

WORKSHEET

Materials: *Water, Water, Everywhere* worksheet; pencils.

Procedure: Have students complete the worksheet.

Wrap Up: Review the worksheets.

- How were they alike? different?
- Can the students connect the water cycle to the importance of conserving water?

In the Beginning...

Relate the importance of water quality to living things along the Rio Grande.

Science: Identify plant and animal communities and factors that impact these communities.

Introduction: It isn't always clear what effect a substance that enters the air or water will have on plants and animals. We need to determine if a substance is harmful or safe before using it. Find out how much the children know about absorption in plants.

- Why do plants have leaves? roots?
- How does water get into a plant?
- Is all water good for plants?
- What does a healthy plant look like?

ACTIVITY

Materials: 1 small potted plant; 1 large zip-lock bag; baking soda; vinegar; water.

Procedure: Water a small potted plant. Seal it in a zip-lock bag and watch what happens in a few days. The water is absorbed through the roots, then travels up the stem into the leaves, where it is "breathed out" by the plant. Water vapor collects inside the plastic bag.

Next, with an acid solution (1/2 cup vinegar and 1/2 cup water) water the plant. Re-seal the bag and watch for changes in the next three days. (To neutralize acid, water with 1/2 cup baking soda in 1/2 cup water. Repeat next day.)

Wrap Up: In this water cycle model, the effects of pollution are apparent.

- How did the vinegar affect the plant?
- What other water solutions might harm the plant? help the plant?

When we pollute the water cycle or the Rio Grande, we harm many living things, including ourselves.

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Explorer's Name _____

Water, Water, Everywhere

Complete the Water Cycle...

Fill in the ◯ with the number of the correct term.

1. Precipitate (rain, snow)
2. Condense (crowd together)
3. Evaporate (change to gas)

Briefly describe the water cycle using the numbered terms.

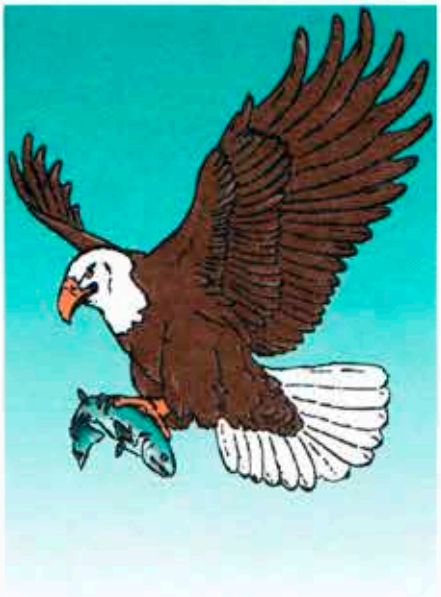
_____

_____

_____

_____

_____



The Rio as an Ecosystem

All animals live where they have access to the resources they need. From prehistoric times to the present, people, plants and animals have all coexisted along the Rio Grande. The fifth longest river in North America, the 1,885-mile-long Rio Grande presents an excellent example of a riparian zone, a ribbon of green that travels through the arid southwest landscape. This green corridor helps reduce floods, improve water quality and channel excess water to replenish the aquifer. The Rio is also an environment providing food, shelter and cover for such widely varying species as the raccoon, spadefoot toad, roadrunner and black-chinned hummingbird. Protecting the Rio Grande ecosystem provides us with living examples of the relationships among living and non-living things. As we study these relationships we learn more about the workings of nature and our place in the ecosystem, and why conservation is so important.

Is It Alive?

Distinguish between living and non-living things.

Science: Observe and describe similarities/differences among plants and animals. Observe and classify objects by more than one attribute.
Language Arts: Write to express ideas using pictures and symbols.

Introduction: Lead a discussion with the students about the differences between living and non-living things:

- How are people and animals similar?
- How are people and plants similar?
- How are plants and people different?
- How are rocks and people different or similar?
- Can you name some living things? non-living things?

ACTIVITY

Materials: Paper; pencils, crayons.

Procedure: Have the students fold a sheet of paper in half. Tell them to draw a happy face (living) at the top of the paper in one column and a rock (non-living) in the other. Have the students bring these charts on a nature walk. Find a spot outside where the students can stop and observe the environment. For each living or non-living thing they find, have them draw a symbol of what they find in the appropriate column. Remind them that they are guests visiting a habitat and they should not pick up or remove a living or non-living thing from the place where it was found.

Wrap Up: When you return to the classroom, discuss their findings.

- Were there any living things that looked non-living?
- Did you see any living things using non-living things?

Remind the students that as people we differ from other living things because we can purposely change the things we find in our environment to fit our needs. But, we must realize that the changes we make can affect the future of other living and non-living things.

Color It Wild!

Recognize the ways in which living and non-living things interact with each other in the Rio Grande ecosystem.

Science: Investigate and show ways people depend on plants and animals.
Social Studies: Discuss the importance of water to life.
Art: Create an original piece of art and describe it.

Introduction: Introduce the concept that a river is one kind of ecosystem - a place where living and non-living parts interact with each other. For example, the river provides water for plants to grow, which in turn can provide food or shelter for animals. Begin a discussion about interdependence using the questions below.

- How do animals/plants use the river? the area close to it?
- How do people use the river, a non-living thing?
- What parts of the river can animals/plants use?

WORKSHEET

Materials: *Color It Wild!* worksheet; pencils; crayons.

Procedure: Have students complete the worksheet. Use the picture on the worksheet to help them understand that a river is home to many kinds of plants and animals. Allow them time to discuss the many ways people might use the river, too.

Wrap Up: Find out how much the students understand about the Rio Grande.

- What might happen to plants/animals if there were no water in the riverbed? too much?
- What might happen to animals if there were no plants?
- What might happen to plants if there were no animals?

Make a river mural. Let the students draw, color in and label the living and non-living things found in a river's ecosystem.

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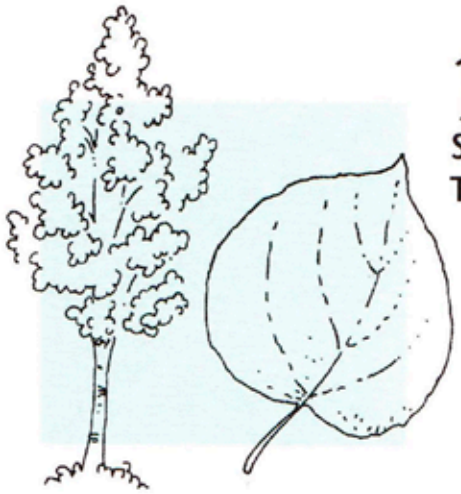
Plants Beat the Heat



1.

Spread out a wet paper towel. This represents an aspen leaf.

2.

Tightly roll up another wet towel and wrap it in waxed paper. Poke holes in it. This is a pine needle.

3.

Roll up a third wet towel and wrap it in a sheet of waxed paper. Use a paper clip to keep each end closed. This is a cactus stem, which has taken over the job of most leaves.

4.

Put the "leaves" in a warm, dry place. Guess what will happen.

_____

_____

_____

_____

_____

_____

5.

The following day, feel each "leaf." How have they changed?

_____

_____

_____

_____

_____

_____

Stewardship

Rivers are among the most important geographical features of the planet. Everywhere rivers are found, there are many different kinds of living organisms using them, especially humans. Humans living along the Rio Grande have changed it in many ways, by building dams and ditches along its course; by emptying chemicals and waste materials into it; by allowing cattle to trample its banks. Wetlands and young bosques of the Rio Grande have nearly disappeared. Testing the quality of the Rio's water regularly is one way to figure out what we need to do to keep the river healthy. Many people who work for government and civic organizations, along with concerned citizens, care about the Rio and work hard to maintain and reestablish the many kinds of plants and animals threatened by polluted water. The best cure for pollution, however, is learning how to avoid creating it.

River Rangers

Observe ways we can protect the Rio Grande.

Science: Identify choices people have in the care of the environment and the consequences of those choices.
Social Studies: Begin to identify ways to protect water, air and land.

Introduction: With an increasing human population along areas of the Rio Grande, the opportunity for problems on the river also increases. By observing the river ecosystem people will be better able to protect it.

- Have you ever seen the Rio Grande?
- What did it look like?
- Did you see things that didn't belong there, either in the river or along its banks?
- What can we do to help the Rio Grande?

By recycling, conserving water and controlling pollution we can keep the river healthy for all living things.

WORKSHEET

Materials: *River Rangers* worksheet; pencils or crayons.

Procedure: Have the student complete the worksheet by choosing the best activities for the river.

Wrap Up: Have students discuss their choices.

- Why is it important not to waste water?
- How does recycling help the river?
- What can students do to protect the river?

Be a River Ranger and remind people to take care of the river and keep it clean.

Safe to Drink?

Identify visible and invisible factors that may affect water quality.

Science: Observe and describe states of water and changes in them.
Health and Wellness: Identify safety hazards in the environment.

Introduction: Pollution is caused by the introduction of any substance (natural or synthetic) that leads to an unhealthy or hazardous condition. Some forms of water pollution are not easily seen. People use a variety of tests to determine the quality of water. Ask students what they think pollution is.

- Where have you seen pollution?
- What kinds of things could pollute the Rio?
- Why do you think people should work hard to keep water in the Rio clean?

ACTIVITY

Materials: A large empty jar; a small jar filled with river or ditch water; a small jar filled with water from the school water fountain; a small jar filled with muddy water (mix before class); coffee filter.

Procedure: Label the three jars of water. Show the jars to the students. Ask: Which water might you drink? Why? If the only water to wash your clothes in was this (show them a muddy sample), what would you do? Demonstrate how people get clean water into their homes by using a filter. Place the filter over the large jar and slowly pour the muddy water through it. Would this water be safe to drink?

Wrap Up: Help children realize that preventive measures are the best way to keep water clean.

- Does the filter keep all the pollution away?
- What are the other ways we can keep water clean?
- What is the best way to protect living things from pollution?

Remind the students that even though the sample looks clean, some things can't be seen with your eyes. Water quality experts use special materials to discover whether water really is safe to drink.

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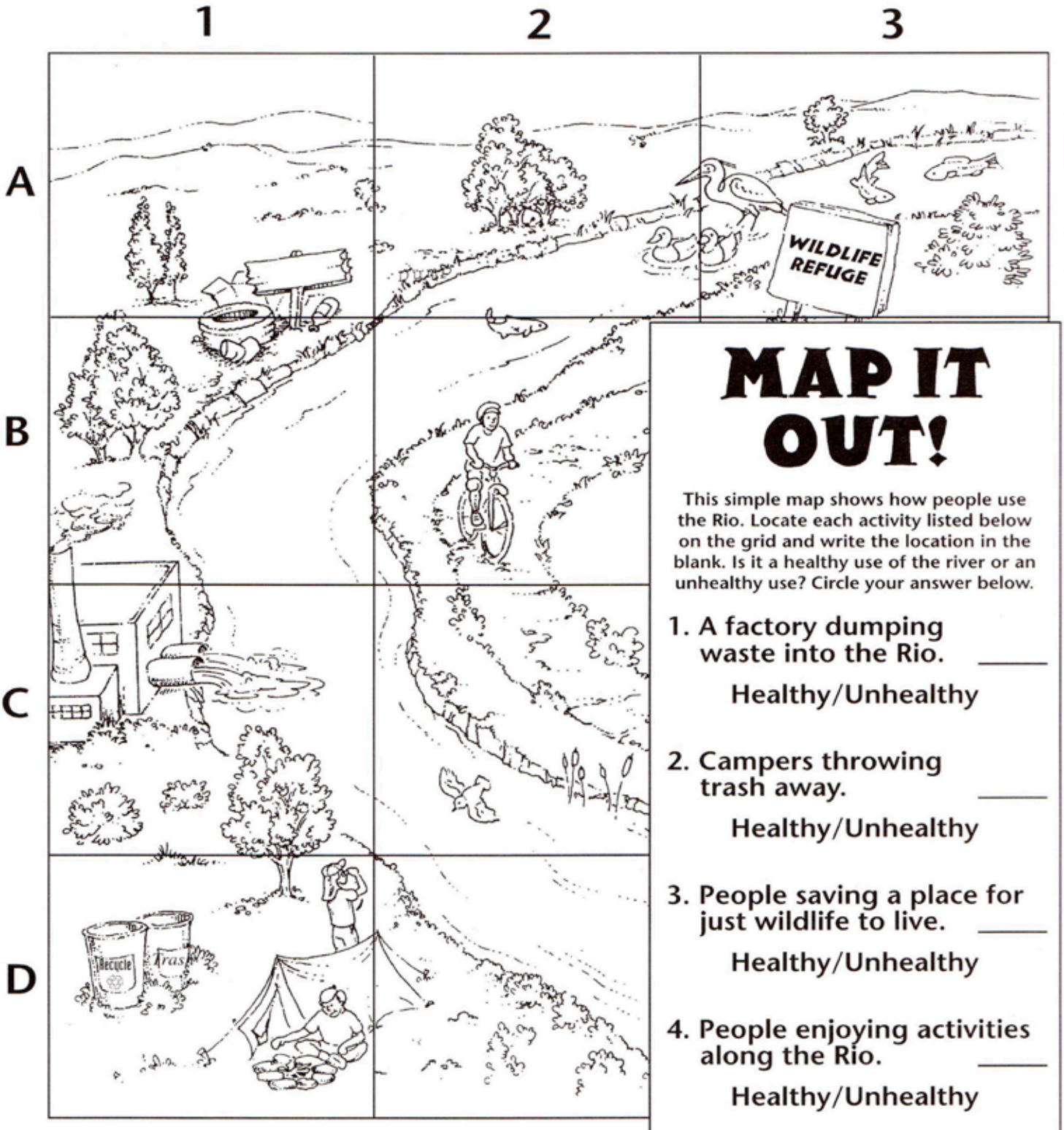

MAP IT OUT!

This simple map shows how people use the Rio. Locate each activity listed below on the grid and write the location in the blank. Is it a healthy use of the river or an unhealthy use? Circle your answer below.

1. A factory dumping waste into the Rio. _____
   Healthy/Unhealthy

2. Campers throwing trash away. _____
   Healthy/Unhealthy

3. People saving a place for just wildlife to live. _____
   Healthy/Unhealthy

4. People enjoying activities along the Rio. _____
   Healthy/Unhealthy